Physics 161
University of New Mexico
Summer 2015

Instructor: Dr. Mark Morgan-Tracy Email: mtracy@unm.edu	Course Number: PHYC 161 Section Number: 001	Meeting Place: Regener 103 Meeting Time: MTWR 9:00-10:15 AM

Office Hours in 109 Regener Hall: Every Day After Class, 10:30-12:00

Friday, 9:30-12:30 PM

Home Page: physics.unm.edu/Courses/morgan-tracy/161/Phys161Summer15.htm

Course Description

Welcome to Physics II, the second semester of calculus-based introductory physics. This semester we will be covering electricity, magnetism, induction, and thermodynamics. These topics are the supreme accomplishments of nineteenth century physics and continue your study of "classical physics". All of the technology we use every day are based on applications of these topics, and I hope that you come to appreciate them the way I do.

I hope that you do well in this course. You will need to work hard to succeed. I can only do so much to cram the concepts that we will cover into your brain. The rest is up to you. If you are willing to really think about what you are reading, to do the homework, and most importantly to let me know when you're still not getting something, then I'm sure we can have a very successful class for everyone.

Prerequisites

Prerequisite: Physics 160 (Physics I).

Corequisite: Math 163 (Calculus II).

Text

The textbook used for this class is the 13^{th} edition of **University Physics** by Young and Freedman, Pearson Addison-Wesley, 2008.

Learning Outcomes

The overall objective is that the students can describe physical phenomena using a variety of models and develop certain analytical skills associated with problem solving. By the end of the course, the student should be able to:

- Calculate the electric force or electric field for point charges using Coulomb's Law.
- Use integration to find the electric field for a one-dimensional charge distribution.
- Determine the appropriate Gaussian surface to use in finding the electric flux for a simply-symmetric charge distribution.
- Calculate the electric potential for point charges and simple charge distributions.
- Analyze circuits containing combinations of resistors and capacitors using Ohm's and Kirchoff's laws.
- Use the right-hand rule for predicting the direction of the force on a moving charged particle in a magnetic field and the direction of the magnetic field created by current carrying wires, current loops, and solenoids.
- Use the Biot-Savart or Ampere's law to find the magnetic field created by current carrying wires, current loops, and solenoids.
- Apply Faraday's law to predict the induced emf and induced current values in induction problems.
- Use Lenz's law to predict the direction of the induced current in a solenoid.
- Apply the first law of thermodynamics to predict certain thermal responses of a substance
- Calculate the work done by an ideal gas during isobaric, isochoric, and isothermal processes
- Apply the second law of thermodynamics and the concept of entropy to predict whether a process is spontaneous or possible
- Apply the thermal expansion and specific-heat equations to predict certain thermal responses of a substance.

Office Hours

I will be available to provide additional tutoring and to help students with their homework in room 109 of Regener Hall every day after class until noon and on Fridays (9:30-12:30). I realize that these times will, most likely, be inconvenient to those students who have jobs or other classes, and I encourage you to contact me to set up an appointment for a different time. Email is the best and quickest way of contacting me. I will try my best to accommodate your schedule. *Note:* There will be no office hours held on July 3.

Calculator

Even Physics II's numerical-calculation requirements are fairly simple. To that end, you do not need a scientific or graphing calculator for this class. The basic requirements are that your calculator must be able to do scientific notation, as well as simple trigonometric (sine, cosine, and tangent) functions. If you have a scientific calculator, I encourage you to use it to its full capacity; however, its use on homework and tests (especially for integration) must be clearly indicated.

Course Requirements

I-Clickers: I-clickers will be used throughout the lecture to give students the opportunity to actively participate in the lecture and to interact with each other. Throughout each lecture, students will be given a series of conceptual or easy-to-calculate questions. Upon initially seeing the question, students are required to use their clickers to answer the question individually. Students will then discuss their answers with nearby classmates and the question will be given again. Students who get the correct answer on the second try will receive three points while students who still have an incorrect answer will receive two points. Non-attendance will result in zero points. For each lecture, each student's total points divided by that day's maximum will give a score out of 1. At the end of the term, your three lowest days will be dropped in determining your average.

If you do not have an I-clicker from the previous semester, one can purchased at the bookstore. You must register your I-clicker for the new semester by going to `www.iclicker.com/registration` and following the instructions there. Students should use their NetID when registering their clicker. Please note that **you must re-register your I-clicker every term**. If you have never registered a clicker before, you will be charged a small fee by the I-clicker website.

Reading Quizzes: Most days after class, a specific reading assignment will be posted on the class's webpage. To earn points for doing that reading assignment, students are required to answer two questions that are to be turned in at the end of the next lecture:

1. What, in your opinion, was the most important concept of the reading assignment?
2. What concept in the reading assignment did you have the most trouble understanding? (What was the "muddiest point"?) If everything was clear then what was the most interesting concept?

The answers to these questions must be complete sentences and must have proper spelling and punctuation. (No text spelling will be accepted.)

At the end of lecture students will spend a minute answering one additional question:

3. Did today's lecture help with your muddy point? If not, what are you still confused about? If so, are there any other points in today's lecture that you did not understand?

Students will receive one point per question answered. When determining your reading quiz average at the end of the term, your three lowest scores will be dropped.

Homework: Each week, I will be assigning 5-10 homework problems. Students *must go to the class's webpage to find the homework problems.* A large fraction of the assigned problems will be modified versions of textbook questions. I encourage you to form study groups with other students in this class and work on the homework together; physics is a collaborative subject. Homework assignments will be **neatly** written out by the students and must show all steps. Each problem will be worth five points and will be graded based upon the level of completion. Assignments are due Friday at 12:30 PM and may be turned into me during my office hours. (The week of the July-4th holiday, homework will be due on Monday.) Late homework will not be accepted, but students may turn in missed assignments for a 65% participation grade. **I do not drop a homework score!** Homework averages will be based on the maximum class score. If somebody earns the maximum possible homework score, there will be no curve.

Mini-Tests: After completing the topic from the previous class, students will have an in-class, two- or three-question test at the end of the first lecture of every week. (The week after the July-4th holiday, the mini-test will be on Tuesday.) The questions will be based on the previous week's homework material and will be of similar difficultly. Each mini-test will be worth ten points and will be graded similar to the homework. Your lowest mini-test grade will be dropped when determining the semester average. Students should bring a calculator with them to lecture for the mini-tests.

Final Exam: An in-class comprehensive final exam will be given on the last day of class, Thursday July 23, during normal class time. You must take the final in order to pass the class. In the event that UNM has a closure on the date of the final exam, final grades for students will be calculated based upon the work assessed up to that point.

Course Grade: At the end of the semester, the course grade will be calculated based upon the following percentages. In the case that the average of **all seven** mini-test grades exceeds the homework average, the higher average will be used for your homework score.

Reading Quiz: 5%	In-Class Clickers: 10%	Homework: 25%	Mini-Tests: 40%	Final Exam: 20%

Letter grades will be assigned according to the following scale:

A+: 99-100	**A**: 93-98.99	**A-**: 90-92.99	**B**+: 87-89.99	**B**: 83-86.99	**B-**: 80-82.99
C+: 77-79.99	**C**: 73-76.99	**C-**: 70-72.99	**D**+: 67-69.99	**D**: 63-66.99	**D-**: 60-62.99

Attendance Policy

Regular and punctual attendance is required. UNM Pathfinder policies apply, which in part means instructor drops based on non-attendance are possible. This policy applies regardless of the grading option you have chosen.

Accommodation Statement

Accessibility Services (Mesa Vista Hall 2021, 277-3506) provides academic support to students who have disabilities. If you think you need alternative accessible formats for undertaking and completing coursework, you should contact this service right away to assure your needs are met in a timely manner. If you need local assistance in contacting Accessibility Services, see the Bachelor and Graduate Programs office.

Course Calendar

Below you will find important dates and a listing of the topics covered along with the corresponding text chapter and a rough estimate of how long I believe it will take to cover them. Students should consult the class webpage for specific information about which

sections of each chapter will be covered during class.

Week	Date	Topic	Week	Date	Topic
1	June 1	Ch. 21 - Electric force and field	5	June 29	Ch. 27 - Magnetic Fields and Magnetic Forces
					Ch. 28 - Sources of Magnetic Fields
	June 5	Last Day to Add Class.		July 3	No Office Hours
2	June 8	Ch. 22 - Gauss's Law	6	July 6	Ch. 29 - Electromagnetic Induction
					Ch. 30 - Inductance
	June 12	Last Day to Drop Class with 100% Refund		July 11	Last Day to Drop Without Dean's Permission
3	June 15	Ch. 23 - Electric Potential	7	July 13	Ch. 17 - Temperature and Heat
		Ch. 24 - Capacitance and Dielectrics			Ch. 18 - Thermal Properties of Matter
4	June 22	Ch. 25 - Current, Resistance, and Electromotive Force	8	July 20	Ch. 19 - The First Law of Thermodynamics
		Ch. 26 - Direct Current Circuits			Ch. 20 - The Second Law of Thermodynamics
				July 24	Final Exam